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Review Epilepsy Seizure Disorder

Mr. Arpit Rajaram Suralkar[1], Mr. Vaibhav Prakashrao Deshmukh[2], Mr. Nishant Bhikaji Chopade[3]

[1]H.S.B.P.V.T. Group of Institutions, College of Pharmacy, Kashti, Shrigonda, Maharashtra, India
[2,3]Dr. Rajendra Gode College of Pharmacy, Malkapur, Maharashtra, India

ABSTRACT

Epilepsy affects both sexes and all ages with worldwide distribution. The prevalence and the incidence of epilepsy are slightly higher in men compared to women and tend to peak in the elderly, reflecting the higher frequency of stroke, neurodegenerative diseases, and tumors in this age-group. Focal seizures are more common than generalized seizures both in children and in adults. The etiology of epilepsy varies according to the sociodemographic characteristics of the affected populations and the extent of the diagnostic workup, but a documented cause is still lacking in about 50% of cases from high-income countries (HIC). The overall prognosis of epilepsy is favorable in the majority of patients when measured by seizure freedom. Reports from low/middle-income countries (LMIC; where patients with epilepsy are largely untreated) give prevalence and remission rates that overlap those of HICs. As the incidence of epilepsy appears higher in most LMICs, the overlapping prevalence can be explained by misdiagnosis, acute symptomatic seizures and premature mortality. Studies have consistently shown that about one-half of cases tend to achieve prolonged seizure remission. However, more recent reports on the long-term prognosis of epilepsy have identified differing prognostic patterns, including early and late remission, a relapsing-remitting course, and even a worsening course (characterized by remission followed by relapse and unremitting seizures). Epilepsy per se carries a low mortality risk, but significant differences in mortality rates are expected when comparing incidence and prevalence studies, children and adults, and persons with idiopathic and symptomatic seizures. Sudden unexplained death is most frequent in people with generalized tonic-clonic seizures, nocturnal seizures, and drug refractory epilepsy.

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INTRODUCTION

Epilepsy is a chronic noncommunicable disease of the brain that affects around 50 million people worldwide. It is characterized by recurrent seizures, which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized) and are sometimes accompanied by loss of consciousness and control of bowel or bladder function.

Seizure episodes are a result of excessive electrical discharges in a group of brain cells. Different parts of the brain can be the site of such discharges. Seizures can vary from the briefest lapses of attention or muscle jerks to severe and prolonged convulsions. Seizures can also vary in frequency, from less than one per year to several per day.

One seizure does not signify epilepsy (up to 10% of people worldwide have one seizure during their lifetime). Epilepsy is defined as having two or more unprovoked seizures. Epilepsy is one of the world's oldest recognized conditions, with written records dating back to 4000 BCE. Fear, misunderstanding, discrimination and social stigma have surrounded epilepsy for centuries. This stigma continues in many countries today and can impact on the quality of life for people with the disease and their families.

Epilepsy is a chronic non communicable disease of the brain that affects people of all ages.

- Around 50 million people worldwide have epilepsy, making it one of the most common neurological diseases globally.

- Nearly 80% of people with epilepsy live in low- and middle-income countries.
- It is estimated that up to 70% of people living with epilepsy could live seizure- free if properly diagnosed and treated.
- The risk of premature death in people with epilepsy is up to three times higher than for the general population.
- Three quarters of people with epilepsy living in low-income countries do not get the treatment they need.
- In many parts of the world, people with epilepsy and their families suffer from stigma and discrimination

Classification

It is necessary to determine the type of seizure in order to focus the diagnostic approach on a particular etiologic factor, to select the appropriate drug therapy, to conduct scientific investigations that require delineation of clinical and EEG phenotypes, and to provide vital information regarding the prognosis.[4,5]

In 1981, the International League against Epilepsy (ILAE) published a modified version of the International Classification of Epileptic Seizures (ICES), which has continued to be a very useful system.[5] This system is based on the clinical features of seizures and associated EEG findings. The etiology or cellular substrate is not considered.

There are three main types of seizures: partial, generalized, and unclassified.[5] A modified version of the ICES is presented in Table 1

Types of Epileptic Seizures

Partial (focal) seizures ➢ Simple partial (with motor, sensory, autonomic, or psychic signs; consciousness is not impaired) ➢ Complex partial (consciousness is impaired) ➢ Partial seizures evolving to secondarily generalized seizures
Primarily generalized seizures ➢ Absence (petit mal) ➢ Myoclonic ➢ Clonic ➢ Tonic ➢ Tonic–clonic (grand mal) ➢ Atonic
Unclassified seizures ➢ Neonatal seizures ➢ Infantile spasms

Partial

Partial seizures are confined to discrete areas of the cerebral cortex; only a certain area of the body is usually involved, at least at the start.[5] By contrast, generalized seizures are noted in diffuse regions of the brain.

Simple partial seizures cause motor, sensory, autonomic, or psychic symptoms without an obvious alteration in consciousness. These seizures may also be manifested as changes in somatic sensation (e.g., paresthesias or tingling), vision, equilibrium, autonomic function olfactory changes, and hearing.

Complex partial seizures are characterized by focal seizure activity, accompanied by transient impairment of the patient's ability to maintain normal contact with the environment. Partial seizures can spread to involve both cerebral hemispheres and may produce a generalized seizure, usually of tonic-clonic variety. Secondary generalization is often observed following simple partial seizures, especially those with a focus in the frontal lobe.[5]

Generalized

Generalized seizures arise from both cerebral hemispheres simultaneously.[5] Absence seizures (petit mal) are characterized by sudden, brief lapses of consciousness without loss of postural control. The seizure typically lasts for only seconds; consciousness returns as suddenly as it was lost, and there is no postictal confusion. A typical absence seizures have features that deviate clinically and electro physiologically from typical absence seizures. For example, the lapse of consciousness is usually of longer duration and less abrupt in onset and cessation.

A simple absence seizure is defined as a brief clouding of the sensorium, or loss of consciousness, accompanied by certain generalized epileptic discharges without other detectable clinical signs. A complex absence seizure indicates that other signs are

also present. Generalized, tonic–clonic seizures (formerly grand mal) are the main seizure type in approximately 20% of all persons with epilepsy. They are also the most common seizure type resulting from metabolic derangements and are therefore frequently encountered in many different clinical settings.[5]

Atonic seizures are characterized by sudden loss of postural muscle tone lasting 1 to 2 seconds. Consciousness is briefly impaired, but there is usually no postictal confusion.[5] Myoclonus is a sudden and brief muscle contraction that may involve one part of the body or the entire body

Unclassified

Not all seizure types are partial or generalized; this appears to be true of seizures that occur in neonates and infants.[5] Some of the seizures that occur in neonates and infants likely result, in part, from differences in neuronal function and connectivity in the immature brain.[5]

EPILEPSY SYNDROMES

Epilepsy syndromes are disorders in which epilepsy is a predominant feature, with evidence indicating a common underlying mechanism. Important epilepsy syndromes include the following:

Juvenile myoclonic epilepsy is a generalized seizure disorder of unknown cause, appearing in early adolescence. It is usually characterized by bilateral myoclonic jerks that may be single or repetitive.[5] Consciousness is not affected unless the myoclonus is particularly severe. In addition, many patients experience generalized tonic–clonic seizures, and up to one-third of patients have absence seizures.[5]

Lennox–Gastaut syndrome is associated with central nervous system (CNS) disease. It is a severe form of epilepsy in children when seizures usually begin before four years of age. There may be periods of frequent seizures mixed with brief, relatively seizure-free periods. It is defined by the following triad:[5]

- multiple seizure types, usually including generalized tonic–clonic, atonic, and atypical absence seizures
- EEG features showing slow (below 3 cycles per second [hertz, Hz]) spike-and-wave discharges and other abnormalities
- impaired cognitive function in most cases

Seizur types include:

- tonic (stiffening of the body, upward deviation of the eyes, dilation of the pupils, and altered respiratory patterns).
- atonic (brief loss of muscle tone and consciousness, causing abrupt falls).
- atypical absence (staring spells).
- myoclonic (sudden muscle jerks).

Mesial temporal lobe syndrome is the most common epilepsy syndrome. It is associated with complex partial seizures and exemplifies a symptomatic, partial epilepsy with distinct clinical, EEG, and pathological features.[5]

Signs and symptoms

Characteristics of seizures vary and depend on where in the brain the disturbance first starts, and how far it spreads. Temporary symptoms occur, such as loss of awareness or consciousness, and disturbances of movement, sensation (including vision, hearing and taste), mood, or other cognitive functions.

People with epilepsy tend to have more physical problems (such as fractures and bruising from injuries related to seizures), as well as higher rates of psychological conditions, including anxiety and depression. Similarly, the risk of premature death in people with epilepsy is up to three times higher than in the general population, with the highest rates of premature mortality found in low- and middle-income countries and in rural areas.

A great proportion of the causes of death related to epilepsy, especially in low- and middle-income countries, are potentially preventable, such as falls, drowning, burns and prolonged seizures.

Rates of disease

Epilepsy accounts for a significant proportion of the world's disease burden, affecting around 50 million people worldwide. The estimated proportion of the general population with active epilepsy (i.e. continuing seizures or with the need for treatment) at a given time is between 4 and 10 per 1000 people.

Globally, an estimated 5 million people are diagnosed with epilepsy each year. In high-income countries, there are estimated to be 49 per 100 000 people diagnosed with epilepsy each year. In low- and middle-income countries, this figure can be as high as 139 per 100 000. This is likely due to the increased risk of endemic conditions such as malaria or neurocysticercosis; the higher incidence of road traffic injuries; birth-related injuries; and variations in medical infrastructure, the availability of preventive health programmes and accessible care. Close to 80% of people with epilepsy live in low- and middle-income countries.

Causes

Epilepsy is not contagious. Although many underlying disease mechanisms can lead to epilepsy, the cause of the disease is still unknown in about 50% of cases globally. The causes of epilepsy are divided

into the following categories: structural, genetic, infectious, metabolic, immune and unknown. Examples include:

- brain damage from prenatal or perinatal causes (e.g. a loss of oxygen or trauma during birth, low birth weight);
- congenital abnormalities or genetic conditions with associated brain malformations;
- a severe head injury;
- a stroke that restricts the amount of oxygen to the brain;
- an infection of the brain such as meningitis, encephalitis or neurocysticercosis,
- certain genetic syndromes; and
- a brain tumour.

Treatment

Seizures can be controlled. Up to 70% of people living with epilepsy could become seizure free with appropriate use of antiseizure medicines. Discontinuing anti-seizure medicine can be considered after 2 years without seizures and should take into account relevant clinical, social and personal factors. A documented etiology of the seizure and an abnormal electroencephalography (EEG) pattern are the two most consistent predictors of seizure recurrence.

- In low-income countries, about three quarters of people with epilepsy may not receive the treatment they need. This is called the "treatment gap".
- In many low- and middle-income countries, there is low availability of antiseizure medication. A recent study found the average availability of generic antiseizure medicines in the public sector of low- and middle-income countries to be less than 50%. This may act as a barrier to accessing treatment.
- It is possible to diagnose and treat most people with epilepsy at the primary health-care level without the use of sophisticated equipment.
- WHO pilot projects have indicated that training primary health-care providers to diagnose and treat epilepsy can effectively reduce the epilepsy treatment gap.
- Surgery might be beneficial to patients who respond poorly to drug treatments.